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L8: Entry 1 of 4

File: USPT

Apr 9, 1991

US-PAT-NO: 5006013

DOCUMENT-IDENTIFIER: US 5006013 A

TITLE: Granular type structure with moisture retaining top surface

DATE-ISSUED: April 9, 1991

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Burkstaller; Herman F.	Nogal	NM		
Brieger; Emmet F.	Nogal	NM		

US-CL-CURRENT: 405/38; 405/265, 405/50

ABSTRACT:

The disclosure is directed to a built-up granular structure having a stable moisture content controlled upper layer. The preferred granular structure includes an improved fine aggregate upper surface layer, a coarse aggregate reservoir layer having a topmost application of perforate adhesive material, and a dry moisture barrier layer having a topmost impervious layer. The entire layered structure is supported by any firm base including compacted soil or an existing playing court structure. A containment wall having screened drainage inlets/outlets surrounds the periphery of the structure.

38 Claims, 2 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 1

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L8: Entry 2 of 4

File: USPT

Aug 7, 1990

US-PAT-NO: 4946719

DOCUMENT-IDENTIFIER: US 4946719 A

TITLE: Drainable artificial turf assembly

DATE-ISSUED: August 7, 1990

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Dempsey; Barry J.	White Heath	IL		

US-CL-CURRENT: 428/17; 273/DIG.13, 428/137, 428/95

ABSTRACT:

An artificial turf assembly has a permeable section formed of an upper layer of artificial turf and a lower layer of shock absorbing material positioned below the upper layer. An impermeable layer is positioned below the permeable section for collecting water flowing downward through the permeable section. The permeable section is separable from the impermeable layer to form a space for the water flow away from the assembly. The space may be formed by having the permeable section lying on the impermeable layer so that it lifts off the impermeable layer and floats on the water that flows through the permeable section. Alternatively, rigid spacing members may be provided for maintaining space between the permeable and impermeable layers in the absence of water.

24 Claims, 2 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 1

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L8: Entry 3 of 4

File: USPT

Jun 29, 1982

DOCUMENT-IDENTIFIER: US 4337283 A

TITLE: Synthetic turf playing surface with resilient top-dressing

Brief Summary Text (27):

The combination of subsurface, pile fabric and top-dressing comprising resilient particles provides excellent shock absorption and a natural footing for players without presenting an abrasive surface. It is less expensive to construct than artificial turfs having resilient underpads and is more durable and easier to maintain than natural turf. The playing surface of the invention eliminates the feeling of walking or running on a springy or spongy surface which is encountered with conventional artificial turfs using foam underpads.

Detailed Description Text (2):

The figure depicts a sectional view through a playing surface according to the present invention. Playing surface 1 starts with a firm, stable subsurface 2 upon which the remainder of the playing surface is constructed. A moisture barrier layer 3 is disposed over subsurface 2. A pile fabric 4 with generally upstanding pile elements resembling grass is positioned on top of moisture barrier 3. In the drawing, the pile fabric 4 is depicted as a woven fabric backing 5 through which a plurality of segments of multi-filament yarn 6 have been tufted to form the upstanding piles. At the free ends of the tufts, the individual filaments 7 can be seen. Among the pile elements on the backing there is a compacted layer of top-dressing 8 comprising a mixture of from 25 to 95% resilient particles and from 5 to 75% fine sand.

Detailed Description Text (4):

Moisture barrier layer 3 functions to reduce water penetration and heaving and to protect the surface from ground moisture. If the subsurface consists of concrete or asphalt pavement, moisture barrier layer 3 may be dispensed with. A suitable moisture barrier layer may be formed with polyethylene sheeting between 2 and 10 mils thick such as is sometimes used as a vapor barrier in pouring concrete. A 6 mil thick sheet has been found to produce excellent results. Another suitable material for the moisture barrier layer is commercial asbestos roofing felt between 30 and 100 pound weight, preferably about 70 pound weight.

Detailed Description Text (35):

Playing surfaces according to the present invention present a very attractive appearance closely resembling the appearance of natural grass turf. Once installed, the playing surfaces of the invention have a very low maintenance cost because they require very little upkeep. At the same time, the playing surfaces of the invention are much more durable than natural turf or earthen surfaces and can be used for virtually continuous play for long periods without exhibiting adverse wear. Playing surfaces of the invention provide outstanding player feel. That is to say, they feel to a player as though they were a natural surface with none of the unnatural springiness or sponginess hitherto characteristic of artificial turf. Furthermore, they are very comfortable and easy on the legs and feet of the player, particularly in comparison with hard pavements. Another advantage is the fact that the characteristics of the playing surface can be readily adjusted according to the type of play desired. Suitable top-dressing materials are readily available. The surfaces of the invention are also much less abrasive than prior top-dressed surfaces.

CLAIMS:

2. A playing surface as recited in claim 1, further comprising a moisture barrier layer between the subsurface and the pile fabric.
4. A playing surface according to claim 2, wherein said moisture barrier is a layer of

30 to 100 pound weight asbestos roofing felt.

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L10: Entry 3 of 20

File: USPT

May 19, 1998

US-PAT-NO: 5752784

DOCUMENT-IDENTIFIER: US 5752784 A

TITLE: Low profile drainage network for athletic field drainage system

DATE-ISSUED: May 19, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Motz; Joseph E.	Concinnati	OH		
Heinlein; Mark A.	Concinnati	OH		
Goddard; James B.	Powell	OH		
Tyner; Carl	Hamilton	OH		

US-CL-CURRENT: 405/37; 405/38, 405/43, 405/51

ABSTRACT:

A drainage system for a natural turf athletic field includes a buried drainage network located above a water impermeable membrane which conforms to the topography of a compacted subsoil, the drainage network including a plurality of water impermeable pipe rows partially recessed in depressions in the subsoil and a plurality of water permeable conduit rows oriented perpendicular to and intersecting the pipe rows. At each intersection, a low profile coupling interconnects the respective pipe row to the respective conduit row, the coupling having a vertical dimension less than the combined vertical dimension of the pipe rows and the conduit rows. A fill layer covers the membrane and supports natural turf thereabove. The drainage network connects to a gravity drain and a water supply. The design of the drainage network results in reduced excavation and simplified construction, thereby lowering the installation cost for the system. The system may also include a subsystem for vacuum-enhanced drainage, or irrigation and sensors for automatically initiating these features.

35 Claims, 7 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 5

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L10: Entry 11 of 20

File: USPT

Aug 7, 1990

US-PAT-NO: 4946719

DOCUMENT-IDENTIFIER: US 4946719 A

TITLE: Drainable artificial turf assembly

DATE-ISSUED: August 7, 1990

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Dempsey; Barry J.	White Heath	IL		

US-CL-CURRENT: 428/17; 273/DIG.13, 428/137, 428/95

ABSTRACT:

An artificial turf assembly has a permeable section formed of an upper layer of artificial turf and a lower layer of shock absorbing material positioned below the upper layer. An impermeable layer is positioned below the permeable section for collecting water flowing downward through the permeable section. The permeable section is separable from the impermeable layer to form a space for the water flow away from the assembly. The space may be formed by having the permeable section lying on the impermeable layer so that it lifts off the impermeable layer and floats on the water that flows through the permeable section. Alternatively, rigid spacing members may be provided for maintaining space between the permeable and impermeable layers in the absence of water.

24 Claims, 2 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 1

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L10: Entry 14 of 20

File: USPT

Feb 25, 1986

US-PAT-NO: 4572700

DOCUMENT-IDENTIFIER: US 4572700 A

TITLE: Elongated bendable drainage mat

DATE-ISSUED: February 25, 1986

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Mantarro; Joseph	Pensacola	FL		
Liu; Keh-Chang	Pensacola	FL		
Dempsey; Barry J.	White Heath	IL		

US-CL-CURRENT: 404/35; 210/486, 404/66, 405/45, 428/17, 428/86, 428/95, 52/169.5

ABSTRACT:

Elongated, bendable drainage mat having a rectangular transverse cross section and comprising a polymeric core having a plurality of substantially rigid fingers extending from one side of a layer and an enveloping water permeable fabric having a permittivity from 0.2 seconds.sup.-1 to 2.0 seconds.sup.-1 and a dynamic permeability after 10.sup.6 loadings of at least 10.sup.-4 centimeters per second.

Apparatus and systems using such drainage mat.

13 Claims, 16 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 10

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L10: Entry 16 of 20

File: USPT

Jul 31, 1984

US-PAT-NO: 4462184

DOCUMENT-IDENTIFIER: US 4462184 A

TITLE: System for improving synthetic surfaces

DATE-ISSUED: July 31, 1984

INVENTOR-INFORMATION:

NAME	CITY	STATE ZIP	CODE	COUNTRY
Cunningham; Percy C.	North Vancouver, British Columbia V7R 3B3		CA	

US-CL-CURRENT: 47/58.1R; 405/37, 47/1.01F, 47/1.01R, 47/2, 472/92

ABSTRACT:

A synthetic surface, such as artificial turf, rubberized asphalt, concrete composition, particulate mixtures and the like, is applied on top of a subsurface base system, which in turn is on top of a subgrade. A liquid impervious membrane is positioned between the subgrade and the base system. The base system comprises an upper layer of sand-containing particulate material in which liquid characteristically moves in the vertical direction and a lower layer of gravel in which liquid characteristically moves well in the horizontal direction as well as downwardly. The material of the upper layer does not significantly penetrate into the gravel. The base system has a non-rutting upper surface. The non-rutting surface is accomplished by planting grass, cutting the grass at least once, and then killing the grass. The synthetic surface is then applied. A conduit system is positioned in the lower gravel layer of the base system, and a water reservoir is established in the base system. In warm temperatures, the synthetic surface can be cooled by maintaining the upper layer of the base system moist, and by circulating cool water into the reservoir and withdrawing warm water therefrom. Conversely, in cold temperatures, warm water can be circulated into the reservoir and colder water therein removed.

22 Claims, 14 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 5

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L10: Entry 17 of 20

File: USPT

Aug 23, 1977

US-PAT-NO: 4044179

DOCUMENT-IDENTIFIER: US 4044179 A

TITLE: Playing surface for athletic games

DATE-ISSUED: August 23, 1977

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Haas, Jr.; Frederick T.	Metairie	LA		

US-CL-CURRENT: 428/17; 428/331, 428/87, 428/95, 472/92, 473/490

ABSTRACT:

A playing surface for athletic games, such as tennis, comprising a flat, firm subsurface, a pile fabric disposed on the subsurface comprising a relatively flexible, moisture-impermeable backing and normally generally upstanding pile elements resembling grass, a compacted layer of granular mineral material disposed among the pile elements on the backing to a depth from about 75% to substantially equal to the length of the pile elements, the mineral layer comprising less than 10% clay and further comprising a quantity of moisture retaining material sufficient to maintain the moisture content of the mineral layer above about 3% by weight under normal climatic conditions.

10 Claims, 2 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 1

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L13: Entry 1 of 6

File: USPT

Apr 24, 2001

US-PAT-NO: 6221445

DOCUMENT-IDENTIFIER: US 6221445 B1

TITLE: Composite artificial turf structure with shock absorption and drainage

DATE-ISSUED: April 24, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Jones; James Martin	Pendleton	SC		

US-CL-CURRENT: 428/17; 405/36, 405/38, 405/43, 405/45, 428/87, 428/92, 428/95

ABSTRACT:

An artificial turf is disclosed which comprises an outer artificial grass layer having a generally uniform exterior playing surface. A deflection layer is disposed below the artificial grass layer. The deflection layer has a prescribed height to provide resiliency for absorbing impact shocks from foot traffic and playing on the artificial grass layer. The deflection layer has a plurality of interstices providing open passages for water drainage; and loose particles are dispersed into the interstices of the deflection layer up to a prescribed level to provide stability and enhance shock absorption so that the deflection layer deflects when the artificial grass is impacted to assist in absorbing the impact and maintain normal playing action of the playing surface of the artificial grass layer. A base surface is disposed below aid deflection layer which includes a flexible grid system having a plurality of individual cells interconnected together to provide flexibility and conform to the contour of a compacted subbase surface.

29 Claims, 7 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 3

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L13: Entry 2 of 6

File: USPT

Nov 2, 1999

US-PAT-NO: 5976645

DOCUMENT-IDENTIFIER: US 5976645 A

TITLE: Vertically draining, rubber-filled synthetic turf and method of manufacture

DATE-ISSUED: November 2, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Daluise; Daniel A.	Southboro	MA		
Lioi; Paul R.	Canton	OH		

US-CL-CURRENT: 428/17; 273/DIG.13

ABSTRACT:

Vertically draining synthetic turf having reduced abrasiveness and increased resilience compared to conventional synthetic turfs. The vertical draining system of the present invention prevents water from accumulating on the turf surface, which could cause the top-dressing layer to "float" and be moved by inundation. The draining system of the present invention incorporates a porous geotextile membrane between an open graded aggregate layer and a sand layer above the aggregate layer to prevent the movement of one aggregate layer into the other. The top-dressing layer consists of resilient particles, preferably a mixture of high and low density rubber. The pile fabric preferably includes an isotropic non-woven backing to add dimensional stability.

23 Claims, 3 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 2

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L13: Entry 6 of 6

File: USPT

Aug 7, 1990

US-PAT-NO: 4946719

DOCUMENT-IDENTIFIER: US 4946719 A

TITLE: Drainable artificial turf assembly

DATE-ISSUED: August 7, 1990

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Dempsey; Barry J.	White Heath	IL		

US-CL-CURRENT: 428/17; 273/DIG.13, 428/137, 428/95

ABSTRACT:

An artificial turf assembly has a permeable section formed of an upper layer of artificial turf and a lower layer of shock absorbing material positioned below the upper layer. An impermeable layer is positioned below the permeable section for collecting water flowing downward through the permeable section. The permeable section is separable from the impermeable layer to form a space for the water flow away from the assembly. The space may be formed by having the permeable section lying on the impermeable layer so that it lifts off the impermeable layer and floats on the water that flows through the permeable section. Alternatively, rigid spacing members may be provided for maintaining space between the permeable and impermeable layers in the absence of water.

24 Claims, 2 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 1

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<u>L12</u>	l4 and l11	24	<u>L12</u>
<u>L11</u>	l1 and l3	109	<u>L11</u>
<u>L10</u>	l1 and l9	20	<u>L10</u>
<u>L9</u>	impermeable	38253	<u>L9</u>
<u>L8</u>	l1 and l2	4	<u>L8</u>
<u>L7</u>	stabliz\$3	4031	<u>L7</u>
<u>L6</u>	geotextile	745	<u>L6</u>
<u>L5</u>	synthetic	338803	<u>L5</u>
<u>L4</u>	filter\$3	602823	<u>L4</u>
<u>L3</u>	drain\$4	226489	<u>L3</u>
<u>L2</u>	impermeable adj layer or barrier adj layer	25424	<u>L2</u>
<u>L1</u>	artificial adj turf	546	<u>L1</u>

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